AEROLOGICAL OBSERVATIONS

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In Table 1 are given the mean free-air temperatures and relative humidities for August for two kite stations, four Weather Bureau airplane stations, and four Navy airplane stations. Normal values are not available for all of these stations, but in most cases they have been determined for some near-by place. A comparison of these with the monthly means indicates small departures at the upper levels in most cases.

An interesting feature of Table 1 is the relatively low temperatures at the upper levels over Chicago as compared with those over Omaha. In this connection it is noted that the resultant free-air winds for the month contained an appreciably greater northerly component over Chicago than over Omaha. (See Table 2.)

At the 1,000-meter level the highest resultant winds occurred over southern Plains States, where they reached 9 meters per second with a strong southerly component. At 4,000 meters the resultant direction over this region was diametrically opposite with considerably lower velocities. Strong southerly components occurred at 6,000 meters over the extreme southern stations.

From Table 3 it will be seen that airplane observations were made on every scheduled day during the month, the maximum height being 7,242 meters, reached at Omaha on the 23d.

TABLE 1.—*Mean free-air temperatures and humidities obtained by airplanes (or kites) during August, 1931*

TEMPERATURE (°C.)

Altitude (meters) m. s. l.	Chicago, Ill.[1] (190 meters)	Cleveland, Ohio[1] (246 meters)	Dallas, Tex.[1] (149 meters)	Due West, S. C.[1] (217 meters)	Ellendale, N. Dak.[2] (444 meters)	Hampton Roads, Va.[3] (2 meters)	Omaha, Nebr.[1] (299 meters)	Pensacola, Fla.[3] (2 meters)	San Diego, Calif.[3] (9 meters)	Washington, D. C.[3] (2 meters)
Surface	18.0	17.7	23.0	23.7	18.4	25.2	17.7	24.2	23.9	22.4
500	19.3	18.8	23.5	21.9	18.2	22.8	18.5	24.0	20.6	21.8
1,000	18.5	18.3	22.7	19.5	17.0	20.6	19.5	20.5	22.8	20.2
1,500	15.5	15.3	20.3	16.3	15.2	------	17.4	------	------	------
2,000	12.0	12.2	17.1	13.1	12.5	13.6	14.8	14.2	19.3	14.7
2,500	9.2	9.3	14.0	9.7	9.6	------	11.7	------	------	------
3,000	6.4	6.6	10.9	6.6	6.8	7.4	8.8	8.8	12.2	8.8
4,000	0.4	1.6	5.3	0.0	0.9	------	2.2	------	------	3.2
5,000	−5.7	−3.4	−1.3	------	------	------	−4.5	------	------	------
6,000	------	−8.4	−7.8	------	------	------	−11.8	------	------	------
7,000	------	------	------	------	------	------	−19.5	------	------	------

RELATIVE HUMIDITY (PER CENT)

Surface	85	86	75	80	70	76	83	86	76	81
500	70	74	72	77	69	67	76	75	82	72
1,000	62	66	66	73	60	63	62	74	57	67
1,500	66	70	62	75	56	------	60	------	------	------
2,000	68	72	62	73	56	66	56	69	52	70
2,500	58	66	63	72	57	------	53	------	------	------
3,000	53	64	62	69	57	67	50	61	52	62
4,000	45	51	50	69	49	------	47	------	------	66
5,000	39	44	44	------	------	------	46	------	------	------
6,000	------	36	41	------	------	------	44	------	------	------
7,000	------	------	------	------	------	------	47	------	------	------

[1] Airplanes (Weather Bureau). [2] Kites. [3] Airplanes (Navy).

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot-balloon observations made near 7 a. m. (E. S. T.) during August, 1931*

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,528 meters)		Brownsville, Tex. (12 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (198 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	N 47 E	0.6	S 37 E	0.6	S 6 E	1.7	N 70 W	2.8	S 89 W	0.8	S 6 W	1.2	S 36 E	1.7	N 61 W	0.2	N 68 W	1.3	S 72 W	0.7	S 55 W	0.6	S 78 E	2.3
500	------	---	S 13 E	7.1	S 48 W	1.8	------	---	N 79 W	2.2	S 77 W	2.2	S 6 W	7.1	N 64 W	2.2	N 84 W	1.0	------	---	S 71 W	2.6	S 72 E	5.6
1,000	------	---	S 12 E	7.5	N 67 W	3.1	------	---	N 63 W	2.8	N 75 W	3.2	S 32 W	7.3	N 80 W	3.0	S 65 W	3.3	S 87 W	1.9	S 80 W	2.4	S 69 E	5.3
1,500	------	---	S 16 E	6.0	N 58 W	4.3	------	---	N 67 W	3.7	N 80 W	3.6	S 35 W	4.8	S 88 W	3.7	S 87 W	4.1	N 88 W	3.2	S 79 W	2.2	S 75 E	3.8
2,000	S 17 E	1.3	S 26 E	5.4	N 57 W	5.2	N 81 W	3.8	N 73 W	4.1	N 74 W	4.5	S 53 W	2.9	S 76 W	4.6	N 80 W	5.3	N 84 W	5.4	S 82 W	2.0	S 80 E	2.8
2,500	S 25 W	1.4	S 30 E	4.5	N 66 W	6.0	S 76 W	3.4	N 48 W	3.5	N 65 W	4.9	N 40 W	2.5	S 81 W	5.4	N 70 W	7.6	N 88 W	6.5	S 66 W	2.8	S 74 E	2.8
3,000	S 61 W	1.4	S 41 E	2.4	N 63 W	7.3	S 86 W	3.4	N 34 W	3.9	N 73 W	5.3	N 10 W	3.5	S 87 W	5.0	N 75 W	8.2	S 88 W	6.7	S 75 W	3.4	S 79 E	3.0
4,000	N 31 W	0.5	S 22 E	0.8	N 73 W	6.1	N 70 W	4.2	------	5.2	N 37 W	3.0	N 13 E	5.0	N 84 W	6.2	N 66 W	7.9	N 88 W	8.8	S 67 W	3.7	S 50 E	3.3
5,000	N 16 E	1.9	------	---	------	---	N 54 W	3.8	------	---	N 4 E	4.9	------	---	S 77 W	6.0	N 38 W	7.3	N 89 W	10.8	S 13 W	2.6	S 60 E	2.6

Altitude (meters) m. s. l.	Los Angeles, Calif. (127 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (145 meters)		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (392 meters)		Omaha, Nebr. (299 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	S 75 E	0.1	S 34 W	0.4	S 18 W	1.4	N 62 E	0.4	N 75 W	0.9	S 5 E	2.1	S 22 E	1.4	S 73 E	2.5	S 37 E	3.1	N 87 E	0.5	S 32 E	0.8	N 2 E	0.7
500	S 78 E	1.0	S 84 W	0.8	S 57 W	4.4	S 9 E	0.4	S 60 W	2.0	S 7 W	4.9	S 4 W	3.5	S 67 E	3.1	------	---	S 50 E	1.7	N 25 E	1.0	N 12 W	3.3
1,000	N 64 E	0.6	N 66 W	1.2	S 75 W	4.7	S 22 W	1.0	N 83 W	2.9	S 31 W	9.2	S 34 W	5.2	S 57 E	1.6	------	---	S 79 W	1.8	N 13 E	2.6	N 32 W	2.8
1,500	S 24 W	0.6	N 87 E	0.8	S 88 W	4.4	S 20 W	1.8	S 78 W	3.0	S 53 W	5.5	S 72 W	4.2	S 0.7		S 30 E	4.8	N 82 W	3.1	N 6 W	2.6	N 48 W	4.6
2,000	S 18 E	1.7	S 26 E	0.8	N 59 W	2.3	S 39 W	1.4	S 48 W	3.8	S 76 W	2.5	N 85 W	3.9	S 51 E	0.2	S 1 W	4.3	N 71 W	4.4	N 35 W	1.4	N 60 W	5.3
2,500	S 27 E	3.5	S 31 W	3.2	N 43 W	2.8	S 53 W	1.8	S 37 W	5.2	N 41 W	2.7	N 62 W	4.3	S 25 E	0.9	S 33 W	2.5	N 54 W	4.7	N 59 W	1.6	N 67 W	5.2
3,000	S 30 E	5.4	S 32 W	5.4	N 36 W	2.6	S 70 W	2.2	S 44 W	7.0	N 14 W	2.6	N 33 W	3.8	S 49 E	3.5	S 64 W	3.1	N 35 W	5.3	N 55 W	4.2	N 70 W	6.7
4,000	S 45 E	3.3	S 44 W	8.1	------	---	N 89 W	2.8	------	---	N 18 W	2.3	N 35 W	4.8	------	---	S 78 W	5.1	N 19 E	4.8	------	---	N 60 W	5.1
5,000	------	---	------	---	------	---	N 79 W	2.4	------	---	------	---	N 10 E	5.5	------	---	N 66 W	8.3	N 11 E	4.8	------	---	------	---

TABLE 3.—*Observations by means of airplanes, kites, captive and limited-height sounding balloons during August, 1931*

	Dallas, Tex.[1]	Due West, S. C.	Ellendale, N. Dak.	Chicago, Ill.[1]	Cleveland, Ohio[1]	Omaha, Nebr.[1,2]
Mean altitudes (meters), m. s. l., reached during month	5,898	2,590	3,337	5,101	5,785	6,248
Maximum altitude (meters), m. s. l., reached	6,304	4,450	[3] 4,712	5,692	6,283	7,242
Number of flights made	31	26	32	31	31	24
Number of days on which flights were made	31	25	31	31	31	24

[1] Airplanes.
[2] Observations began Aug. 8.
[3] Limited-height sounding-balloon observation.